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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,371	12/29/2003	Lu Zhen	ARC-P133	8167

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PATENT LAW GROUP LLP
2635 NORTH FIRST STREET
SUITE 223
SAN JOSE, CA 95134

EXAMINER	
HUBER, JEREMIAH C	

ART UNIT	PAPER NUMBER
2621	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/748,371	ZHEN ET AL.	
	Examiner	Art Unit	
	Jeremiah C. Huber	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/29/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pyramidal Implementation of the Lucas Kanade Feature Tracker Description of the Algorithm (hereafter Bouguet) in view of Clayton (20040017507).

In regard to claim 1 Bouguet discloses a method including:

warping a first level image of a first image pyramid with a motion field (Bouguet 2.1 for image pyramid and 2.3 particularly pg. 5 note B_k new translated image);

determining a residual motion field from the warped first level image of the first image pyramid and a corresponding first level image of the second image pyramid (Bouguet 2.3 particularly pg. 5 note residual v^k) ;

if an error value is not less than a threshold, adding the residual motion field to the motion field and repeating the above steps (Bouguet 2.3 particularly pg. 5 note eq. 31 adding residual motion v^k further computation continues until pixel is smaller than a threshold); and

if an error value less than the threshold performing the above steps using the second level image of the first and second image pyramids (Bouguet 2.2 particularly pg. 2 note results are propagated from deeper to upper levels).

It is noted that Bouguet discloses comparing a pixel error to a threshold rather than a residual motion vector. However, Clayton discloses a motion compensation method wherein a residual motion is compared to a threshold as a test to stop an iterative process (Clayton par. 130 note iteration causes a change in motion vector to be less than a threshold). It is therefore considered obvious that one of ordinary skill in the art would recognize the advantage of include a residual motion vector threshold as taught by Clayton in the invention of Bouguet in order to reduce computation time incurred by computing pixel errors.

In regard to claim 2 refer to the statements made in the rejection of claim 1 above. Bouguet further discloses generating first and second image pyramids (Bouguet 2.1).

In regard to claim 3 refer to the statements made in the rejection of claim 1 above. Bouguet further discloses determining the motion field from the first level image of the first image pyramid and the corresponding first level image of the second image pyramid (Bouguet 2.2 particularly pg. 2 note displacement vectors found between images I and J, also note algorithm proceeds from the highest, i.e. first to the lowest level).

In regard to claim 8 refer to the statements made in the rejection of claims 1-3 above.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bouguet in view of Clayton as applied to claims 1-3 above, and further in view of The Laplacian Pyramid as a Compact Image Code (hereafter Burt).

In regard to claim 4 refer to the statements made in the rejection of claim 1 above. Bouguet further discloses filtering of images during generation (Bouguet 2.1 pg. 2). It is noted that Bouguet does not disclose generating Laplacian pyramids. However, at the time of the invention the use of Laplacian image pyramids was common and notoriously well known in the art as is evidenced by Burt (Burt note Laplacian Pyramid pgs. 535-537). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would recognize the advantage of utilizing Laplacian Pyramids in the invention of Bouguet in view of Clayton as was well known in the art in order to enhance image features as suggested by Burt (Burt pg. 535 col. 2).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bouguet in view of Clayton as applied to claims 1-3 above, and further in view of Determining Optical Flow (hereafter Horn).

In regard to claim 5 refer to the statements made in the rejection of claim 2 above. It is noted that Bouguet does not disclose use of a Horn and Schunk motion estimation algorithm. However, at the time of the invention use of the Horn and Schunk motion algorithm was common and notoriously well known in the art as is evidence by Horn (Horn pgs. 1-14 describe the Horn and Schunk algorithm). It is therefore considered obvious that one of ordinary skill in the art at the time of the invention would

recognize the advantage of utilizing the Horn and Schunk algorithm in the invention of Bouguet in view of Clayton order to have a robust estimation of motion as suggested by Horn (Horn Abstract).

Claims 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bouguet in view of Clayton as applied to claims 1-3 above, and further in view of Hazra et al (6594313).

In regard to claim 6-7 refer to the statements made in the rejection of claim 1 above. Clayton further discloses that a residual motion vector below a threshold is indicative of a 'true' match (Clayton par. 130). It is noted that neither Bouguet nor Clayton disclose details of generating intermediate images. However, Hazra discloses a method of frame interpolation in which intermediate frames are generated when temporal correlation is high (true matches can be found) by determining pairs of corresponding points from first and second images and determining values and positions of points in the current image from corresponding points in the first and second images (Hazra Figs. 4, 6-7 and 10 and col. 5 lines 13-32, and col. 7 line 57 to col. 8 line 18). Hazra further discloses and not using the above method when temporal correlation is low (true matches cannot be found) (Hazra col. 9 lines 42-49). It is therefore considered obvious that one of ordinary skill in the art would recognize the advantage of utilizing a frame interpolation technique as taught by Hazra in the invention of Bouguet in view of Clayton in order to increase the video framerate as suggested by Hazra (Hazra col. 1 lines 6-8).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremiah C. Huber whose telephone number is (571)272-5248. The examiner can normally be reached on Mon-Fri 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jeremiah C Huber
Examiner
Art Unit 2621

Mehrdad Dastouri
MEHRDAD DASTOURI
SUPERVISORY PATENT EXAMINER
TC 2600